

Serial No.: 10/676,240

IN THE CLAIMS:

Please amend the claims as follows:

1. (Previously Presented) A method for per-session network address translation (NAT) learning in a media gateway, the method comprising:

in the media gateway:

- (a) receiving a media session setup request for establishing a media session in which media packets are exchanged between communicating entities;
- (b) in response to the media session setup request, assigning a local network and transport address combination identifying a media processing resource within the media gateway for processing the media packets associated with the media session;
- (c) receiving at least one initial media packet of the media packets exchanged between the communicating entities in the media session, the at least one initial media packet being addressed to the local network and transport address combination and having a source network address and a source transport address, each of the source network address and the source transport address being a NAT-translated address assigned by a network address translator;
- (d) learning the NAT-translated source network address and the NAT-translated source transport address from the at least one initial media packet;

Serial No.: 10/676,240

- (e) processing the at least one initial media packet using the media processing resource assigned to the media session;
 - (f) accepting and processing subsequent media packets having the assigned local network address and local transport address in their destination address fields and the learned source network address and the learned source transport address in their source address fields; and
 - (g) repeating steps (a)-(f) for each new incoming session to the media gateway and thereby performing NAT learning on a per-session basis.
2. (Previously Presented) The method of claim 1 wherein receiving the media session setup request includes receiving a request from a soft switch to allocate resources for a new media session.
 3. (Original) The method of claim 1 wherein the media session comprises at least one voice call.
 4. (Previously Presented) The method of claim 1 wherein the media session comprises a Real-time Transmission Protocol (RTP) media stream.
 5. (Previously Presented) The method of claim 1 wherein assigning the local network and transport address combination includes assigning the local network and transport address combination to a media processing chip for processing the media session.
 6. (Previously Presented) The method of claim 1 wherein learning the NAT-translated source network address includes:

Serial No.: 10/676,240

- (a) receiving the at least one initial media packet at the media processing resource;
 - (b) routing the at least one initial media packet from the media processing resource to a central processing unit (CPU) operatively associated with the media processing resource; and
 - (c) at the CPU, extracting the NAT-translated source network address from the at least one initial media packet and thereby learning the NAT-translated source network address and broadcasting the learned source network address to a plurality of network interface cards in the media gateway.
7. (Previously Presented) The method of claim 6 comprising extracting the NAT-translated source transport address from the at least one initial media packet and thereby learning the NAT-translated source transport address and broadcasting the learned source transport address to the plurality of network interface cards in the media gateway.
8. (Previously Presented) The method of claim 7 comprising, at the plurality of network interface cards, using the learned source network address, the learned source transport address, the local network address, and the local transport address to create a per-session pin-hole for firewall filtering.
9. (Previously Presented) The method of claim 1 wherein learning the NAT-translated source network address includes dynamically assigning one of a

Serial No.: 10/676,240

plurality of distributed media processing elements in the media gateway to learn the NAT-translated source network address.

10. (Previously Presented) The method of claim 1 wherein learning the NAT-translated source network address includes:
 - (a) receiving the at least one initial media packet at the media processing resource; and
 - (b) at the media processing resource, extracting the NAT-translated source network address and thereby learning the NAT-translated source network address and broadcasting the learned source network address to a plurality of network interface cards in the media gateway.
11. (Previously Presented) The method of claim 10 comprising broadcasting the learned source transport address to the plurality of network interface cards in the media gateway.
12. (Previously Presented) The method of claim 11 comprising, at the plurality of network interface cards, using the learned source network address, the learned source transport address, the local network address, and the local transport address to create a per-session pin-hole for firewall filtering.
13. (Previously Presented) The method of claim 10 wherein the media session comprises a voice-over-IP-to-voice-over-IP media stream and wherein accepting and processing subsequent media packets associated for the media session includes receiving subsequent media packet associated with the media session at a first network interface card, determining a destination network interface card

Serial No.: 10/676,240

based on a destination address, and forwarding all the subsequent media packets to the selected destination network interface card.

14. (Previously Presented) The method of claim 1 comprising, after step (d), performing firewall filtering for the subsequent media packets using the local network address, the local transport address, the NAT-translated source network address, and the NAT-translated source transport address.
15. (Previously Presented) The method of claim 14 wherein performing firewall filtering includes rejecting media packets that have the local network address and the local transport address in their destination address fields but do not have the NAT-translated source network address and the NAT-translated source transport address in their source address fields.
16. (Previously Presented) The method of claim 1 wherein the media session comprises a voice call and wherein the method further comprises seamlessly inserting an internal media processor into the voice call without changing topology of the voice call during any time of the voice call, including call initialization time, call active state, and call release time.
17. (Previously Presented) The method of claim 16 wherein inserting the internal media processor into the voice call includes inserting at least one of: an announcement server, a conference bridge, a DTMF generator, a DTMF collector, a voice mail server, and a law enforcement circuit into the voice call.
18. (Previously Presented) The method of claim 1 wherein the media session comprises a voice call and wherein the method further comprises comprising

Serial No.: 10/676,240

seamlessly inserting an external media processor into the voice call without changing topology of the voice call for the duration of the voice call, including call initialization time, call active state, and call release time.

19. (Previously Presented) The method of claim 18 wherein inserting the external media processor into the voice call includes inserting at least one of: an announcement server, a conference bridge, a DTMF generator, a DTMF collector, a voice mail server, and a law enforcement circuit into the voice call.
20. (Currently Amended) A media gateway with internal network address translation (NAT) learning capabilities, the media gateway comprising:
 - (a) a plurality of network interface cards for receiving media packets exchanged between communicating entities in media sessions, for determining whether the media packets have been assigned to a session, and for forwarding the media packets that have been assigned to the session to a media processing resource;
 - (b) a plurality of media processing resources for processing the media packets that have been assigned to [[the]] sessions, the plurality of media processing resources being assigned to the media sessions based on media session setup requests, wherein, when a media session setup request is received, a local network and transport address combination identifying the media processing resource in the media gateway for processing media packets associated with the session is assigned to the session; and

Serial No.: 10/676,240

- (c) a NAT learning function located within the media gateway and operatively associated with the media processing resources and the plurality of network interface cards for learning, from at least one initial media packet of the media packets exchanged between communicating entities in each session, NAT-translated source network addresses and NAT-translated source transport addresses assigned by a network address translator to the media packets and for communicating the learned source network and transport addresses to the network interface cards.
21. (Previously Presented) The media gateway of claim 20 wherein the plurality of network interface cards comprise packet network interface cards.
22. (Previously Presented) The media gateway of claim 20 wherein the plurality of network interface cards comprise ATM network interface cards.
23. (Previously Presented) The media gateway of claim 20 wherein the plurality of media processing resources include voice-over-IP SAR chips for processing voice-over-IP calls.
24. (Original) The media gateway of claim 23 wherein the NAT-learning function is performed by the voice-over-IP SAR chips.
25. (Original) The media gateway of claim 24 comprising a plurality of voice server modules associated with the voice-over-IP SAR chips, a central processing unit located on each voice server module for controlling the voice-over-IP SAR chips, wherein the NAT learning function is performed by one of the central processing units that is dynamically assigned to the session.

Serial No.: 10/676,240

26. (Previously Presented) The media gateway of claim 20 wherein the plurality of media processing resources include a first codec and a second codec and wherein the first codec and the second codec are used to perform transcoding for at least one of voice-over-IP to voice-over-IP calls, voice-over-IP to voice-over-AAL1 calls and voice-over-IP to voice-over-AAL2 calls.
27. (Previously Presented) The media gateway of claim 20 wherein the NAT learning function is adapted to distribute the learned source network addresses and the learned source transport addresses to at least one of the plurality of network interface cards and wherein the plurality of network interface cards are adapted to accept media packets addressed to the local network address and the local transport address, the learned source network address, and the learned source transport address assigned to the session.
28. (Previously Presented) The media gateway of claim 27 wherein the plurality of network interface cards are adapted to reject media packets addressed to the local source network address and local source transport address assigned to the session but that do not have the learned source network address and learned source transport address assigned to the session.
29. (Previously Presented) The media gateway of claim 20 wherein the NAT learning function is adapted to selectively filter media packets for each session based on the local network address, the local transport address, the learned source address, and the learned transport address assigned to each session, thereby performing firewall filtering on a per-session basis.

Serial No.: 10/676,240

30. (Previously Presented) A computer program product for per-session network address translation (NAT) learning in a media gateway, the computer program product comprising computer executable instructions embodied in a computer readable medium for performing steps comprising:

in the media gateway:

- (a) receiving a media session setup request for establishing a media session in which media packets are exchanged between communicating entities;
- (b) in response to the media session setup request, assigning a local network and transport address combination identifying a media processing resource within the media gateway for processing the media packets associated with the media session;
- (c) receiving at least one initial media packet of the media packets exchanged between the communicating entities in the media session, the at least one initial media packet being addressed to the local network and transport address combination, the at least one initial media packet having a source network address and a source transport address, each of the source network address and the source transport address being a NAT-translated address assigned by a network address translator;
- (d) learning the NAT-translated source network address and the NAT-translated source transport address from the at least one initial media packet;

Serial No.: 10/676,240

- (e) processing the at least one initial media packet using the media processing resource assigned to the media session;
 - (f) accepting and processing subsequent media packets having the local network address and local transport address in their destination address fields and the learned source network address and the learned source transport address in their source address fields; and
 - (g) repeating steps (a)-(f) for each new session to the media gateway and thereby performing NAT learning on a per-session basis.
31. (Previously Presented) The computer program product of claim 30 wherein receiving the media session setup request includes receiving a request for allocating resources for a new media session from a soft switch.
32. (Original) The computer program product of claim 30 wherein the media session comprises a voice call.
33. (Previously Presented) The computer program product of claim 30 wherein the media session comprises a Real-time Transmission Protocol (RTP) media stream.
34. (Previously Presented) The computer program product of claim 30 wherein the media session comprises a Real-time Transmission Control Protocol (RTCP) media stream.
35. (Previously Presented) The computer program product of claim 30 wherein assigning the local network and transport address combination includes

Serial No.: 10/676,240

assigning the local network and transport address combination to a media processing chip for processing the media session.

36. (Previously Presented) The computer program product of claim 30 wherein learning the NAT-translated source network address includes:

- (a) receiving the at least one initial media packet at the media processing resource;
- (b) routing the at least one initial media packet from the media processing resource to a central processing unit (CPU) operatively associated with the media processing resource; and
- (c) at the CPU, extracting the NAT-translated source network address from the at least one initial media packet and thereby learning the NAT-translated source network address and broadcasting the learned source network address to a plurality of network interface cards in the media gateway.

37. (Previously Presented) The computer program product of claim 36 comprising extracting the NAT-translated source transport address from the at least one initial media packet and thereby learning the NAT-translated source transport address and broadcasting the learned source transport address to the plurality of network interface cards in the media gateway.

38. (Previously Presented) The computer program product of claim 37 comprising, at the plurality of network interface cards, using the learned source network

Serial No.: 10/676,240

address, the learned source transport address, the local network address, and the local transport address to create a per-session pin-hole for firewall filtering.

39. (Previously Presented) The computer program product of claim 30 wherein learning the NAT-translated source network address includes:

- (a) receiving the at least one initial media packet at the media processing resource; and
- (b) at the media processing resource, extracting the NAT-translated source network address from the at least one initial media packet and thereby learning the NAT-translated source network address and broadcasting the learned source network address to a plurality of network interface cards in the media gateway.

40. (Previously Presented) The computer program product of claim 39 comprising broadcasting the learned source transport address to the plurality of network interface cards in the media gateway.

41. (Previously Presented) The computer program product of claim 40 comprising, at the plurality of network interface cards, using the learned source network address, the learned source transport address, the local network address, and the local transport address to create a per-session pin-hole for firewall filtering.

42. (Previously Presented) The computer program product of claim 39 wherein the media session comprises a voice-over-IP-to-voice-over-IP media stream and wherein accepting and processing subsequent media packets includes receiving subsequent media packets associated with the media session at a first network

Serial No.: 10/676,240

interface card, determining a destination network interface card based on a destination address in the subsequent media packets, and forwarding the subsequent media packets to the selected destination network interface card.

43. (Original) The computer program product of claim 42 wherein accepting and processing subsequent media packets include performing transcoding for the media packets.
44. (Previously Presented) The computer program product of claim 42 wherein accepting and processing subsequent media packets includes forwarding the subsequent media packets to the selected destination interface card without performing transcoding.
45. (Original) The computer program product of claim 36 comprising, after step (c), performing firewall filtering for the subsequent media packets associated with each session using the local network address, the local transport address, the learned source network address, and the learned source transport address.
46. (Previously Presented) The computer program product of claim 45 wherein performing firewall filtering includes rejecting media packets that have the local network address and the local transport address in their destination address fields but do not have the learned source network address and the learned source transport address in their source address fields.
47. (Previously Presented) The computer program product of claim 30 wherein the media session comprises a voice call and wherein the computer program product further performs the step of seamlessly inserting an internal media processor into

Serial No.: 10/676,240

the voice call without changing topology of the voice call during any time of the voice call, including call initialization time, active state, and call release time.

48. (Previously Presented) The system of claim 47 wherein seamlessly inserting the internal media processor into the voice call includes seamlessly inserting at least one of: an announcement player, a conference bridge, a DTMF generator, a DTMF collector, a voice mail server, and a law enforcement circuit into the voice call.
49. (Previously Presented) The computer program product of claim 30 wherein the media session comprises a voice call and wherein the computer program product further performs the step of seamlessly inserting an external media processor into the voice call without changing topology of the voice call during any time of the voice call, including call initialization time, active state, and call release time.
50. (Previously Presented) The system of claim 49 wherein seamlessly inserting the external media processor into the voice call includes seamlessly at least one of: an announcement player, a conference bridge, a DTMF generator, a DTMF collector, a voice mail server, and a law enforcement circuit into the voice call.